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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Kleider et al.	)
For:	Method of Multiple Carrier Communication within a Non-Contiguous Wideband Spectrum and Apparatus Therefor	)
Serial No.:	09/690,993	)
Filed:	October 17, 2000	)
Examiner:	Liu, S.	)
Art Unit:	2634	)

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attention: Board of Patent Appeals and Interferences

APPELLANTS' BRIEF

This brief is being filed in conjunction with a NOTICE OF APPEAL filed herewith.

Any fees required under § 1.17, and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying NOTICE OF APPEAL AND TRANSMITTAL OF APPEAL BRIEF.

This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. § 41.37(c)):

I REAL PARTY IN INTEREST

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VIII CLAIMS APPENDIX

IX EVIDENCE APPENDIX (not applicable)

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I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Motorola, Inc., a Delaware corporation.

II. RELATED APPEALS AND INTERFERENCES

With respect to other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, there are no such appeals or interferences.

III. STATUS OF CLAIMS

A. Status of all claims in the proceeding

1. Clams rejected: 12, 13 and 22
2. Claims allowed: 1-11 and 30
3. Claims withdrawn from consideration but not canceled: none
4. Claims objected to: 14-21 and 23-29
5. Claims canceled: none

B. Identification of claims being appealed

The claims on appeal are: 12-29

IV. STATUS OF ANY AMENDMENTS AFTER FINAL

No amendments have been filed after the most recent Office Action made final, dated April 21, 2005.

V. SUMMARY OF INVENTION

A first aspect of the present invention, which is being appealed, pertains to a method of orthogonal frequency-division multiplex (OFDM) communication via a plurality of subchannels (30) within a noncontiguous wideband channel. The method includes producing (46) a modulation profile of said wideband channel, wherein said modulation profile is responsive to a signal-to-noise ratio (SNR) for each subchannel in said plurality of subchannels within said wideband channel. The method further includes transmitting (48) OFDM data in response to said modulation profile, wherein said transmitting activity transmits said OFDM data over more than one user channel (page 21, lines 4-5).

A further aspect of the present invention, which is being appealed, pertains to an orthogonal frequency-division multiplex (OFDM) communication system (22), which utilizes a plurality of subchannels (30) within a noncontiguous wideband channel (24). The system includes an OFDM receiver (26) configured to obtain a signal-to-noise ratio (SNR) for each subchannel in said plurality of subchannels (30) within said wideband channel (24). The system further includes an OFDM transmitter (28) in communication with said OFDM receiver (26) and configured to transmit OFDM data so that said OFDM receiver receives (page 5, lines 19-25) said OFDM data in each subchannel within said plurality of subchannels within said wideband channel at one of zero subchannel signal level (44) (page 20, lines 3-6 and 13-19), an intermediate subchannel signal level (42), and a maximum subchannel signal level (40) in response to said SNR therein (page 19, lines 31-33.

VI. ISSUES

1. Whether claims 12 and 13 have been improperly rejected under 35 U.S.C. 102(e) as being anticipated by Polley et al. (US Patent No. 6,363,109).

2. Whether claim 22 has been improperly rejected under 35 U.S.C. 102(e) as being anticipated by Wu et al. (US Patent No. 6,134,273).

3. Whether claims 14-21 and 23-29 have been improperly objected to as being dependent upon a rejected base claim.

VII. ARGUMENTS

A. Rejections under 35 U.S.C. §102

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the ... claim. Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

1. Whether claims 12 and 13 have been improperly rejected under 35 U.S.C. 102(e) as being anticipated by Polley et al. (US Patent No. 6,363,109).

In attempting to reject claims, the Examiner has alleged that Polly et al., US Patent No. 6,363,109, makes known each and every feature of the respective claims. However contrary to the Examiner's assertions, Polly et al., minimally fails to make known (or obvious) transmission of OFDM data over "more than one user channel" (emphasis added), where in connection with claim 13 each user channel comprises at least one of said subchannels. In attempting to address applicants' identification of the specific deficiency, the Examiner attempts to identify col. 7, lines 59-67, as making known the same. However contrary to the Examiner's assertions the identified section is silent as to user channels, and alternatively relates to sub-channels, which do not appear to be any different than subchannels as used in context of the present application. Subchannels are not the same as user channels, and consequently the alleged teaching is not supported by the portion of the reference, which has been identified, nor has any other portion been identified which could cure this defect. As a result contrary to the Examiner's assertions,

Polly et al., '109, fails to make known each and every feature of the claims. Consequently, the applicants would assert that the rejection of claims 12 and 13 is improper.

<u>2. Whether claims 22 has been improperly rejected under 35 U.S.C. 102(e) as being anticipated by Wu et al. (US Patent No. 6,134,273).</u>

In attempting to reject claims, the Examiner has alleged that Wu et al., US Patent No. 6,134,273, makes known each and every feature of the claim. However contrary to the Examiner's assertions, Wu et al., minimally fails to make known (or obvious) "said OFDM receiver receives said OFDM data in each subchannel within said plurality of subchannels within said wideband channel at one of <u>zero subchannel signal level</u>, an intermediate subchannel signal level, and a maximum subchannel signal level in response to said SNR therein" (emphasis added). Contrary to the Examiner's assertions, zero subchannel signal level is not equivalent to "n=2 QPSK in table 1". While the applicants do not dispute that the Examiner is entitled to give the broadest reasonable interpretation to the language of the claims, the applicants are of the opinion that the specific interpretation adopted by the Examiner can hardly be said to be reasonable. As previously noted, QPSK involves a modulation protocol, which includes symbols that can be used to discern a pair of bits. The applicants alternatively contend that any such signal, which supports such a modulation protocol would necessarily involve some signal level greater than zero. The Examiner's suggestion implies that you can get something for nothing, which would appear to violate the well known and accepted principles of physics.

Furthermore, the Examiner's position would appear to be at odds with relevant sections of applicants' disclosure at page 20, lines 3-6 and 17-19, wherein applicants note that "[t]hose skilled in the art will appreciate that, since obstructed subchannels 111 call for a transmission of zero energy, OFDM transmitter 28 does not actually transmit on obstructed subchannels 111" and "each obstructed subchannel 111 receives OFDM data 34 at zero subchannel signal level 44 (i.e., does not receive OFDM data 34)". Not only does the Examiner's attempted usage of the phrase violate well known meanings for the word, but the Examiner's attempted usage similarly violates an understanding of the phrase as provided in the detailed description of specification.

Such an interpretation can hardly be said to be reasonable. Because the Examiner's position requires an unreasonable interpretation, the Examiner's rejection can not be said to be properly supported.

In view of the above noted deficiency, each and every feature of the claim can not be said to be taught or suggested by the reference cited by the Examiner. Consequently, the applicants would respectfully request that the rejection of claim 22 be reversed.

3. Whether claims 14-21 and 23-29 have been improperly objected to as being dependent upon a rejected base claim.

In view of the above analysis, the applicants would assert, that the Examiner has failed to establish that any of the cited references either separately or in combination make known or obvious any of the presently pending claims. Consequently, the base claims upon which claims 14-21 and 23-29 are dependent, are in fact improperly rejected, and therefore all the claims, which depend thereon, should no longer be objectionable. The applicants would respectfully request that the Examiner's decision to finally reject and/or object to any of the presently pending claims be overturned, and that the claims be permitted to proceed to allowance.

Respectfully submitted,

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VIII. APPENDIX OF CLAIMS

The following is the text of the claims involved in this appeal:

1. A method of orthogonal frequency-division multiplex (OFDM) communication via a plurality of subchannels within a noncontiguous wideband channel, said method comprising:

receiving a reference signal transmitted over each subchannel in said plurality of subchannels within said wideband channel;

producing a modulation profile of said wideband channel, wherein said modulation profile is responsive to a signal-to-noise ratio (SNR) for each subchannel in said plurality of subchannels within said wideband channel; and

transmitting OFDM data in response to said modulation profile.

2. An OFDM communication method as claimed in claim 1 wherein said producing activity comprises:

establishing a least-SNR requirement;

determining said SNR for each of said subchannels in said plurality of subchannels within said wideband channel; and

designating each of said subchannels having an SNR greater than said least-SNR requirement as a clear subchannel.

3. An OFDM communication method as claimed in claim 2 wherein said producing

activity additionally comprises:

establishing a least-quality-of-service requirement; and

optimizing a throughput of each of said clear subchannels in which a quality-of-service is greater than said least-quality-of-service requirement.

4. An OFDM communication method as claimed in claim 2 wherein said producing activity additionally comprises:

establishing a least-throughput requirement; and

optimizing a quality-of-service of each of said clear subchannels in which a throughput is greater than said least-throughput requirement.

5. A method of orthogonal frequency-division multiplex (OFDM) communication via a plurality of subchannels within a noncontiguous wideband channel, said method comprising:

producing a modulation profile of said wideband channel, wherein said modulation profile is responsive to a signal-to-noise ratio (SNR) for each subchannel in said plurality of subchannels within said wideband channel including

establishing a least-SNR requirement,

determining said SNR for each of said subchannels in said plurality of subchannels within said wideband channel,

designating each of said subchannels having an SNR greater than said least-SNR requirement as a clear subchannel,

sorting said subchannels by said SNRs therein,

adjusting said least-SNR requirement,

determining said SNR for each of said subchannels in said plurality of subchannels within said wideband channel, and

designating each of said subchannels having an SNR greater than said adjusted least-SNR requirement as an impeded subchannel; and

transmitting OFDM data in response to said modulation profile.

6. An OFDM communication method as claimed in claim 5 wherein said producing activity additionally comprises:

determining a noise level for each of said clear and impeded subchannels; and

determining an OFDM data-signal level for each of said clear and impeded subchannels, wherein a subchannel energy level is substantially equal to said OFDM data-signal level for each of said clear subchannels, and said subchannel energy level is substantially equal to a sum of said OFDM data-signal level plus said noise level for each of said impeded subchannels.

7. An OFDM communication method as claimed in claim 1 additionally comprising iterating said producing and transmitting activities to track changes in said SNR in each subchannel of said plurality of subchannels within said wideband channel.

8. An OFDM communication method as claimed in claim 1 wherein said producing activity comprises:

scanning said wideband channel; and

determining said SNR for each of said subchannels in said plurality of subchannels within said wideband channel in response to said scanning activity.

9. A method of orthogonal frequency-division multiplex (OFDM) communication via a plurality of subchannels within a noncontiguous wideband channel, said method comprising:

producing a modulation profile of said wideband channel, wherein said modulation profile is responsive to a signal-to-noise ratio (SNR) for each subchannel in said plurality of subchannels within said wideband channel including

scanning said wideband channel, and

determining said SNR for each of said subchannels in said plurality of subchannels within said wideband channel in response to said scanning activity, comprising ascertaining usable ones of said subchannels in response to said SNR of each of said subchannels, and estimating a bit error rate for each of said usable subchannels; and

transmitting OFDM data in response to said modulation profile.

10. An OFDM communication method as claimed in claim 9 wherein said transmitting activity transmits said OFDM data signal in response to said bit error rate of each of said usable subchannels.

11. A method of orthogonal frequency-division multiplex (OFDM) communication

via a plurality of subchannels within a noncontiguous wideband channel, said method comprising:

producing a modulation profile of said wideband channel, wherein said modulation profile is responsive to a signal-to-noise ratio (SNR) for each subchannel in said plurality of subchannels within said wideband channel including

scanning said wideband channel, and

determining said SNR for each of said subchannels in said plurality of subchannels within said wideband channel in response to said scanning activity, comprising ascertaining usable ones of said subchannels in response to said SNR of each of said subchannels, and estimating a throughput for each of said usable subchannels; and

transmitting OFDM data in response to said modulation profile.

12. A method of orthogonal frequency-division multiplex (OFDM) communication via a plurality of subchannels within a noncontiguous wideband channel, said method comprising:

producing a modulation profile of said wideband channel, wherein said modulation profile is responsive to a signal-to-noise ratio (SNR) for each subchannel in said plurality of subchannels within said wideband channel; and

transmitting OFDM data in response to said modulation profile; and

wherein said transmitting activity transmits said OFDM data over more than one user channel.

13. An OFDM communication method as claimed in claim 12 wherein each of said user channels comprises at least one of said subchannels.

14. An OFDM communication method as claimed in claim 13 wherein:

said producing activity additionally comprises designating each of said subchannels having said SNR less than said least-SNR threshold and greater than an SNR-evaluation threshold as an impeded subchannel; and

said transmitting activity transmits said OFDM data so that each of said impeded subchannels receives said OFDM data at said intermediate subchannel signal level.

15. An OFDM communication method as claimed in claim 14 wherein:

said producing activity comprises determining a signal-to-noise ratio (SNR) for each of said subchannels in said plurality of subchannels within said wideband channel;

said producing activity additionally comprises designating each of said subchannels having said SNR greater than a least-SNR requirement as clear subchannel; and

said transmitting activity transmits said OFDM data so that each of said clear subchannels receives said OFDM data at said maximum subchannel signal level.

16. An OFDM communication method as claimed in claim 15 wherein, said least-SNR requirement is a first least-SNR requirement, and wherein:

said producing activity additionally comprises adjusting said least-SNR requirement to produce a second least-SNR requirement;

said producing activity additionally comprises designating each of said subchannels having said SNR less than said first least-SNR requirement and greater than said second least-SNR requirement as an impeded subchannel; and

said transmitting activity transmits said OFDM data so that each of said impeded subchannels receives said OFDM data at said intermediate subchannel signal level.

17. An OFDM communication method as claimed in claim 16 wherein:

said producing activity additionally comprises designating each of said subchannels not designated as one of said clear subchannel and said impeded subchannel as an obstructed subchannel; and

said transmitting activity transmits said OFDM data so that each of said obstructed subchannels receives said OFDM data at said zero subchannel signal level.

18. An OFDM communication method as claimed in claim 14 wherein said producing activity comprises:

determining a signal-to-noise ratio (SNR) for each of said subchannels in said plurality of subchannels within said wideband channel;

designating each of said subchannels having said SNR greater than a first least-SNR requirement as a clear subchannel;

designating each of said subchannels having said SNR less than said first least-SNR requirement and greater than a second least-SNR requirement as an impeded subchannel;

determining a noise level in response to said SNR for each of said clear and impeded

subchannels; and

deducing an OFDM data-signal level for each of said clear and impeded subchannels, wherein a subchannel signal level is a sum of said OFDM data-signal level plus said noise level for each of said clear and impeded subchannels, and wherein said subchannel signal levels for each of said clear and impeded subchannels are substantially equal.

19. An OFDM communication method as claimed in claim 18 wherein said producing activity additionally comprises:

establishing a least-quality-of-service requirement for each of said clear and impeded subchannels; and

optimizing a throughput of each of said clear and impeded subchannels in which a quality-of-service is greater than said least-quality-of-service requirement.

20. An OFDM communication method as claimed in claim 18 wherein said producing activity additionally comprises:

establishing a least-throughput requirement for each of said clear and impeded subchannels; and

optimizing a quality-of-service of each of said clear and impeded subchannels in which a throughput is greater than said least-throughput requirement.

21. An OFDM communication method as claimed in claim 14 additionally comprising iterating said producing and transmitting activities.

22. An orthogonal frequency-division multiplex (OFDM) communication system utilizing a plurality of subchannels within a noncontiguous wideband channel, said system comprising:

an OFDM receiver configured to obtain a signal-to-noise ratio (SNR) for each subchannel in said plurality of subchannels within said wideband channel; and

an OFDM transmitter in communication with said OFDM receiver and configured to transmit OFDM data so that said OFDM receiver receives said OFDM data in each subchannel within said plurality of subchannels within said wideband channel at one of zero subchannel signal level, an intermediate subchannel signal level, and a maximum subchannel signal level in response to said SNR therein.

23. An OFDM communication system as claimed in claim 22 wherein said OFDM receiver comprises:

a scanning section configured to scan each of said subchannels in said plurality of subchannels within said wideband channel;

a detection section coupled to said scanning section and configured to obtain said SNR for each of said subchannels; and

an evaluation section coupled to said detection section and configured to designate as a clear subchannel each of said subchannels having a SNR greater than a least-SNR requirement.

24. An OFDM communication system as claimed in claim 23 wherein said OFDM

transmitter is configured to transmit said OFDM data so that said OFDM receiver receives said OFDM data in each of said clear subchannels at said maximum subchannel signal level.

25. An OFDM communication system as claimed in claim 23 wherein:

said least-SNR requirement is a first least-SNR requirement;

said evaluation section is additionally configured to designate as an impeded subchannel each of said subchannels having a SNR less than said first least-SNR threshold and greater than a second least-SNR requirement.

26. An OFDM communication system as claimed in claim 25 wherein said OFDM transmitter is configured to transmit said OFDM data so that said OFDM receiver receives said OFDM data in each of said impeded subchannels at said intermediate subchannel signal level.

27. An OFDM communication system as claimed in claim 26 wherein:

said intermediate subchannel signal level is one of a plurality of intermediate subchannel signal levels; and

said OFDM transmitter is configured to transmit said OFDM data so that said OFDM receiver receives said OFDM data in each of said impeded subchannels at one of said plurality of intermediate subchannel signal level s in response to said SNR thereof.

28. An OFDM communication system as claimed in claim 25 wherein said evaluation section is additionally configured to designate as an obstructed subchannel each of said

subchannels not designated as one of said clear subchannels and said impeded subchannels.

29. An OFDM communication system as claimed in claim 28 wherein said OFDM transmitter is configured to transmit said OFDM data so that said OFDM receiver receives said OFDM data in each of said obstructed subchannels at said zero subchannel signal level.

30. A method of orthogonal frequency-division multiplex (OFDM) communication via a plurality of subchannels within a noncontiguous wideband channel, said method comprising:

determining a signal-to-noise ratio (SNR) for each of said subchannels in said plurality of subchannels within said wideband channel;

designating as a clear subchannel each of said subchannels in which said SNR is greater than or equal to a first least-SNR requirement;

designating as an impeded subchannel each of said subchannels in which said SNR is less than said first least-SNR threshold and greater than or equal to a second least-SNR requirement;

designating as an obstructed subchannel each of said subchannels not designated as one of said clear subchannels and said impeded subchannels; and

transmitting OFDM data so that each of said clear subchannels receives said OFDM data at a maximum subchannel signal level, each of said impeded subchannels receives said OFDM data at an intermediate subchannel signal level, and each of said obstructed subchannels receives said OFDM data at zero subchannel signal level.